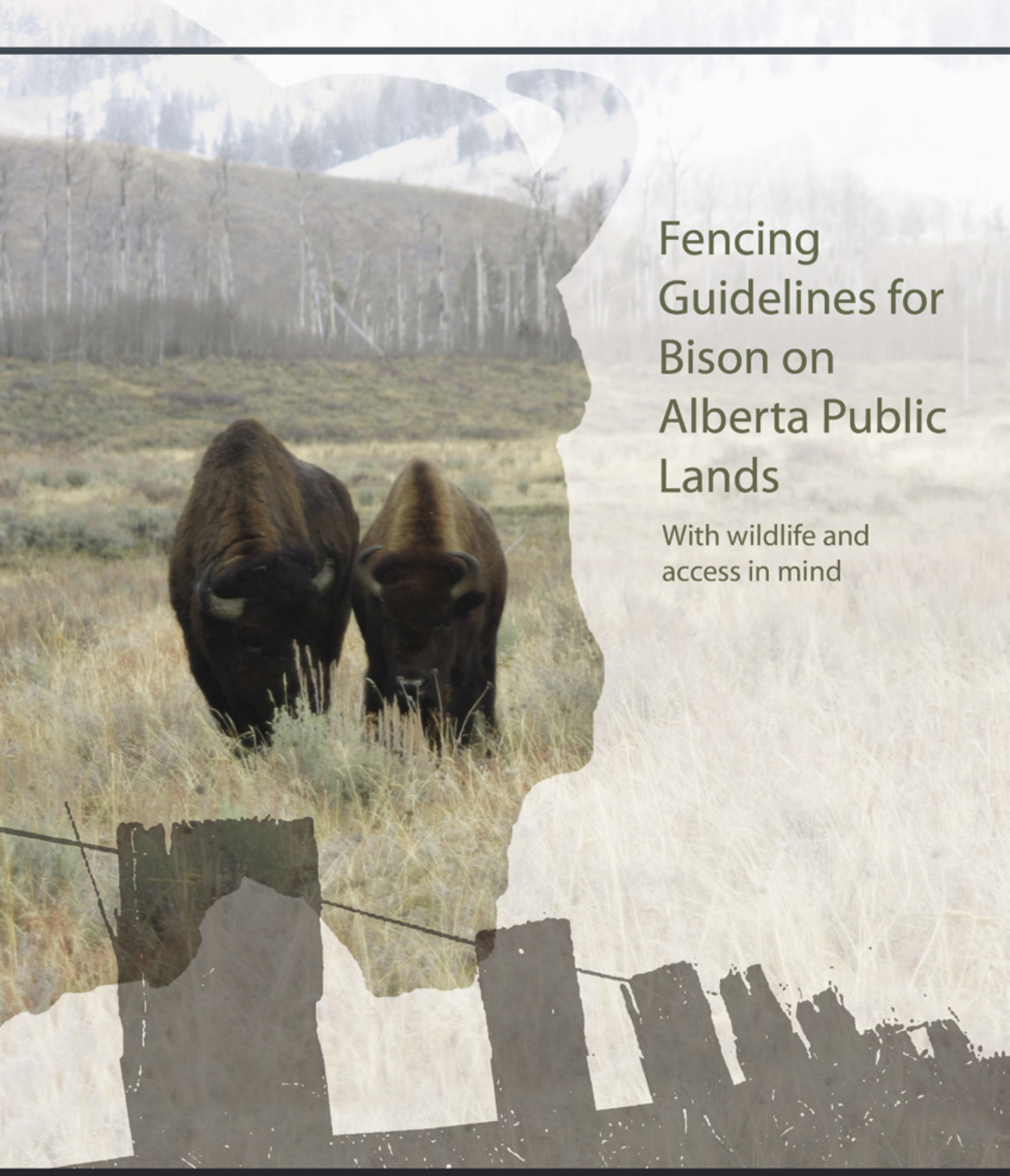

Fencing Guidelines for Bison on Alberta Public Lands

With wildlife and access in mind

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Fencing Guidelines for Bison on Alberta Public Lands

INTRODUCTION

Under an amendment to the Alberta *Public Lands Act*, bison are listed with other livestock species that may be grazed on public lands agricultural dispositions (leases, licenses and permits), subject to conditions defined in approved disposition management plans. Dispositions are fenced agricultural lands already identified and allocated for long-term grazing use. Management plans outline how a grazing disposition is to be managed, including the grazing system, stocking rates, range health, and improvements, including fences permeable to wildlife. Grazing disposition leaseholders must allow reasonable access to public lands for recreation. Bison operators are currently required to apply approved tags to their animals.

In Alberta, rangelands provide ecological conditions for grazing animals and important habitat for a diversity of wildlife species. Although fences are necessary to confine bison and other livestock, they can act as partial or complete barriers to daily movements or seasonal migration of wildlife, resulting in reduced access to food, cover and water. Some fences can entangle big game or cause impact injuries for a number of species, including birds.

These guidelines for fence construction were developed collaboratively by the bison industry, wildlife managers, rangeland managers, environmental and conservation interests, the hunting community, and in consultation with fencing experts. They provide options for fence designs and related structures for confining bison, enabling wildlife movement, reducing hazards to wildlife, and providing access to public rangelands under various geographic situations characteristic of Alberta's landscapes. The guidelines are intended to assist producers and resource managers involved in developing disposition management plans for bison grazing on public lands. These plans will describe mitigation of the effects of lease management on wildlife and specifications for wildlife permeable fences.

PLANNING YOUR FENCE

Bison Containment

Confinement of bison is a legal necessity for the producer. Personal or property damage caused by escaped bison could expose a producer to liability. Escaped bison can travel great distances in a short period of time and can be difficult to capture. Fence security is therefore an important consideration in designing fences for bison.

The need for fence security will vary with site conditions. Fences need to be most secure in areas where the risk to public safety is highest; for example where pastures are next to transportation corridors or developed areas. Fences may also need to be secure in pasture areas adjacent to attractive crops or fields. Fencing requirements vary regionally in the province.

If site conditions of a grazing disposition require fences that are not permeable to wildlife, agency managers may not approve the producer's disposition management plan.

Husbandry and Range Management

The risk of bison straying is significantly reduced with good range management and husbandry practices. It is harder to hold bison in over-utilized pastures: *hungry bison push fences*. Bison will not normally challenge adequate fences if the range is healthy and water is available.

Range management principles applied to maintain or foster healthy productive rangeland include:

- Balancing livestock demands with available forage supply, leaving adequate ungrazed residue to protect plants and soil
- Promoting even livestock distribution by using fencing, salt placement and water development to spread the grazing "load" over the landscape (keep in mind, bison move more than cattle and naturally distribute their grazing activity)
- Avoiding grazing rangeland during vulnerable periods; early spring grazing can stress range plants when energy reserves are depleted as new growth is initiated
- Providing effective rest periods after grazing to allow range plants to recover from the stresses of grazing

More information is available in three publications from Alberta Public Rangeland Management[1]. These documents emphasize the stewardship goal of maintaining sustainable grazing opportunities while protecting health and function of range resources and other related values, and benefits from a healthy range, including wildlife habitat, watershed function, and aesthetic values.

Other husbandry practices that help to contain bison include training them in secure areas to respect fences before releasing them into a new pasture, and returning cows to the same pasture on an annual basis at calving time. Bison cows prefer to use the same pasture when calving and may challenge fences if not given the opportunity to return to the same location used in previous years.

Fence Permeability for Wildlife

Some fence designs can disrupt wildlife movements, fragment home ranges, reduce or eliminate access to forage, cover and water, or cause entanglement or impact injuries. Separation of young from their mothers by impermeable fences can result in abandonment and increased risk of predation.

Permeability requirements vary among large mammal species, and with age. Pronghorn antelope almost always crawl under fences and rarely jump them. For this species, the bottom strand should be smooth wire set at 16" to 20". Among elk, moose, and deer, moose calves are most vulnerable to being separated from their mothers by a poorly designed fence. The bottom wire can be set at 20" high to allow newborn moose and elk to pass, without increasing the risk of bison escaping. Adult moose, elk and deer typically jump fences, but their juveniles tend to go under or through them. Spaces of 10" to 12" between strands will allow for movement through fences built with smooth wires. Smooth wire is more flexible than barbed wire; if barbed wire is used, the space between the bottom and second wire should be wider, up to 18". Many existing livestock fences have a low bottom wire that can impede wildlife movements. Increasing the bottom wire to 16" to 20" in existing fences would improve their permeability to wildlife.

Public Access

In 2003, the Alberta Government clarified the rules for recreational access on agricultural dispositions issued under the *Public Lands Act*, including grazing leases and farm development leases. The legislation balances the needs of leaseholders to protect the land and livestock from harm with the rights of recreational users for reasonable access. An Alberta Sustainable Resource Development web site provides detailed information on recreational access management for public agricultural lands in the province[2]. The conditions regulating public access to grazing dispositions for cattle apply as well to grazing dispositions used for bison.

BUILDING FENCES AND CROSSING STRUCTURES

No single fence design is suitable for all landscapes, site conditions, or containment requirements. This section provides guidelines and design ideas for building fences to satisfy various security requirements, alternatives for building perimeter fences using non-electric and electric wire, and designs for wildlife crossing structures to make high security bison fences more permeable at intervals and at wildlife trails.

Topographic Factors

Building fences with topography in mind can reduce the possibility of bison escaping while facilitating wildlife movement.

Slope

Upward slopes increase the effective height of a fence that runs perpendicular to the slope; top wire height can be reduced accordingly. For example, a 42" high fence built on grades of 10%, 20%, 30%, 40% or 50% has effective upslope barrier heights of 48.6, 55, 62, 68 and 75 inches, respectively. Conversely, fence height may need to be increased where bison are contained by a fence on a downward slope pasture (Figure 1). Fence lines running parallel to a slope may need to be higher to prevent bison from jumping them.

Tree and Vegetation Cover

Tree and vegetation cover near fences can increase fence maintenance. To help with maintaining fences in forested areas, rights of way should be wide enough to reduce the problem of trees falling on the fence and to increase the visibility of the fence for animals approaching it. As a rule of thumb, fence lines should be cleared to a distance of the average tree height on either side of the fence. Shrubs or other vegetation can short out electric fences and should be cleared.

Snow Pack

Packed snow can reduce the effective height of fences. An

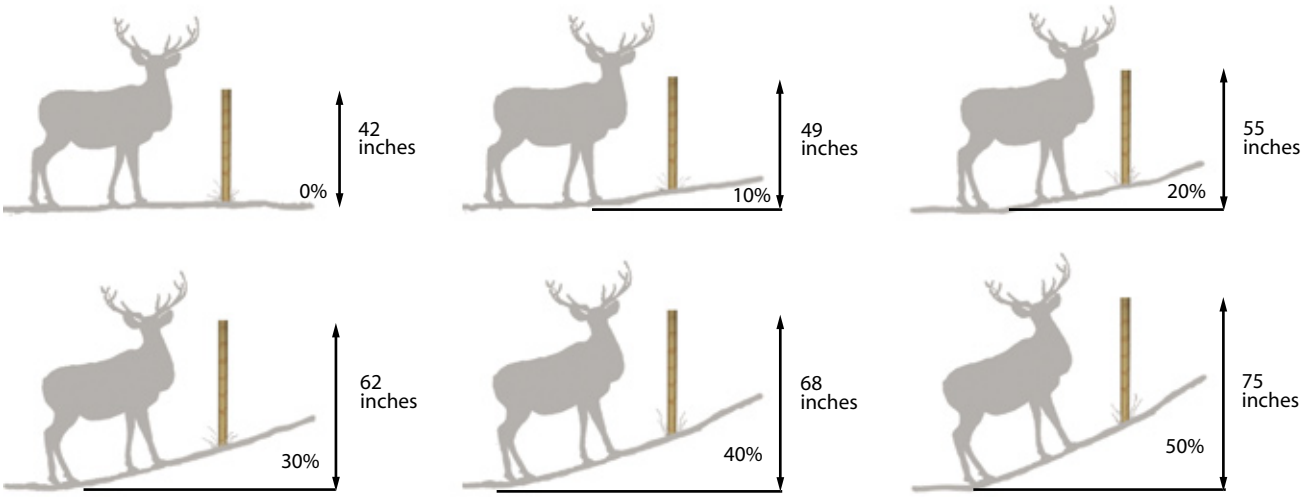

Figure 1. Effective barrier heights for fences on varying slopes (adapted from USDI Bureau of Land Management and USDA Forest Service. 1988. Fences. Missoula Technology and Development Center, Missoula, MT. 210 p).

additional top strand(s) of wire may be required in winter to compensate for reduced effective fence height in snow packed areas. In such areas, posts should be taller to accommodate additional strand(s) of wire. However, a higher top wire will affect the ability of wildlife to cross fences and mitigation measures should be put in place.

Watercourses

Bison are good swimmers; water courses do not serve as a barrier and need to be fenced. Where permitted, fences crossing watercourses should be designed to accommodate both low and high water levels to limit bison moving around the fence and prevent damage to the fence during floods.[3] Under federal law, fences must not obstruct navigable waters.

Agency wildlife managers involved in approving disposition management plans for grazing bison may be concerned with construction of fences within wildlife movement corridors, along the margins of lakes and rivers, or other areas considered important habitat.

Fence Design Specifications

The designs recommended here are general in nature and will need to be adapted to suit specific site conditions.

Barbed wire fences are less wildlife friendly than smooth strand wire fences[4]. High tensile smooth wire is inexpensive, allows safer wildlife passage, and can effectively contain bison. Given the amount of existing barbed wire fencing on grazing dispositions, producers may wish to use a combination of smooth and barbed wire. In such cases, smooth wire is recommended for the top strand and bottom two strands.

Paige wire fences are less permeable than strand wire fences to most big game and some other wildlife species, particularly when secured close to the ground or if sufficiently high to impair wildlife passage. The use of paige wire fences is not recommended for containing bison on public lands. However, there may be circumstances where it is necessary to modify existing paige wire fences to allow for wildlife passage.

Perimeter Fences

For most site conditions the needs of large mammal game species can be accommodated by a general fence design made with five taut, smooth wires, with the bottom wire set 16” to 20” above the ground, the bottom two wires set 12” apart, and the top wire set at 60” (Figure 2). Using spring tensioners on the bottom, second and top wires will make it easier for wildlife to pass under, over, or through the fence (Figure 2). Bison fences built to these specifications may improve wildlife passage relative to conventional fences, which commonly use barbed wire and a lower bottom wire height.

The literature on effects of fence height on deer movements is reasonably complete, indicating that adults can easily jump 60 inches. However, experimental evidence on the effects of fence height on elk and moose movements is inadequate. Some bison producers have observed that deer, elk, and moose readily cross 60 inch high fences.

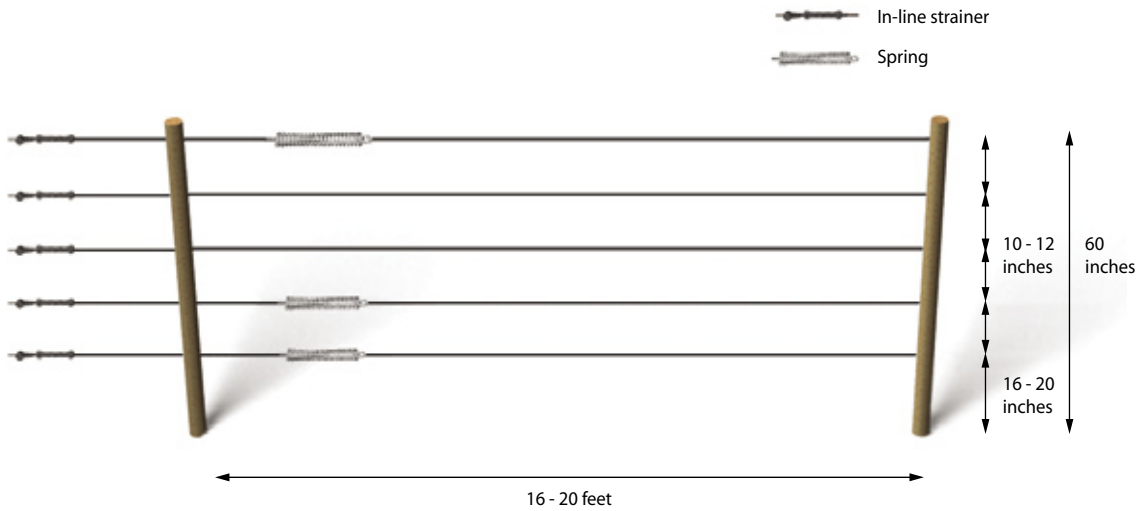

Figure 2. Example of an effective fence design for containing bison, with wildlife in mind. Five or six wires are options. The third wire could be energized for added security. Barbed wire may be used for wires three and higher, except the top wire should be smooth. Wildlife crossing structures are necessary for fences higher than 60 inches or if wildlife is observed to have difficulty crossing over fences.

Given uncertainty about the effect of increasing fence height on wildlife movements and a recognized need for caution to prevent harm to wildlife, mitigation is recommended for fences above 60", or when fences are observed to impede wildlife movements. Mitigation can be achieved by building wildlife crossing structures into fence lines. Crossing structures should be constructed at ¼ mile intervals, and at known game trails or other frequent crossing sites. Information from a pre-construction assessment of wildlife movements and trails around the perimeter of a grazing disposition will facilitate designing a fence with wildlife in mind.

When needed, adding electrified wires can provide additional security, especially if bison are preconditioned to respect electric fencing. With a five wire fence, the middle wire can be energized to good effect. Another option is to add an energized wire strung on commercially available 10" to 12" outriggers attached to every third post.

Electric fencing is most effective if bison are trained in a secure pasture for one to two weeks prior to being moved to extensive pastures where electric fencing is used. High conductance, high visibility shock tape can be an effective training tool. Young bison can be conditioned to electric fences during weaning, resulting in a life long aversion to hot wires.

Electric fences have been used to protect agricultural assets from wildlife in Alberta for more than two decades[5]. For example, they are widely used to protect beehives and other high value properties from bears[6]. A hot bottom wire in a bison fence may deter grizzly and black bear movements and is not recommended.

Wildlife Crossing Structures

As a general guideline, wildlife crossing structures are recommended at ¼ mile intervals and at known game trails when fence height is above 60 inches, or in locations where wildlife is observed to have difficulty jumping over the top wire. Gates can be constructed at regular intervals and should be left open when bison are not present. Similarly, when bison are not present on the disposition, the top wires of a fence can be lowered at intervals to make it easier for wildlife to move. The use of specially designed wire clips (Figure 3) can simplify this task.

Figure 3. Plastic clips can be used to make it easy to lower wires when bison are not in the pasture, or to create wildlife crossings.

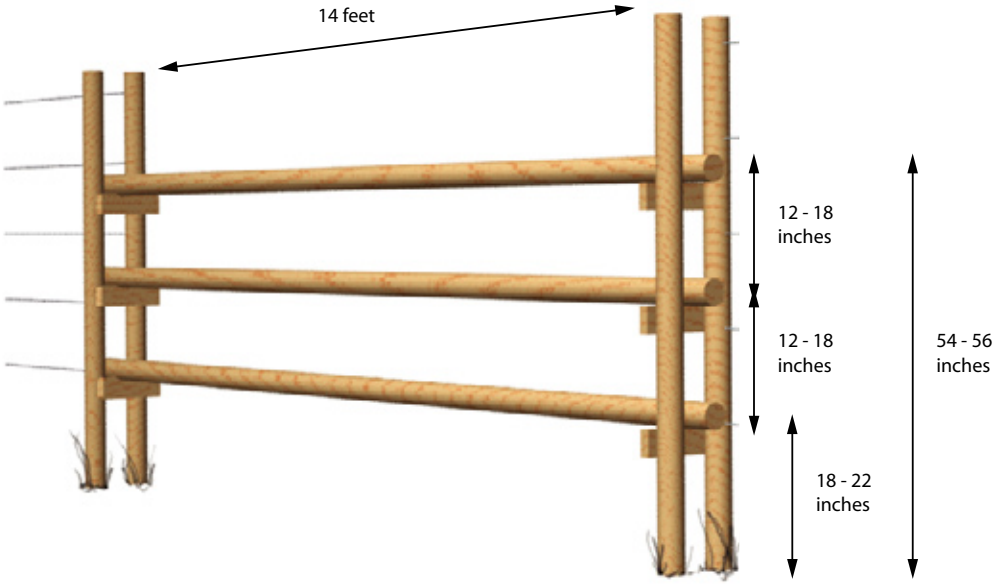

Figure 4. Jump rails for big game. The space between the bottom and second rail should be 18" or more when moose and elk are present.

Jump rails

Jump rails constructed with the design illustrated in Figure 4 allow passage of small and large big game species of all ages, yet prevent all but highly motivated bison from escaping. Do not position jump rails in the corners of a fence line as bison may attempt to jump out if crowded there. The distance between upright posts should not exceed 14 feet and the top rail should be greater than 4" in diameter to withstand pressure. The recommended height for rails is 54" to 56" for the top rail, 18" to 22" for the bottom rail, with a 12" to 18" or greater space between the bottom and second rail (Figure 4). The space between the two lowest rails should be greatest where moose and elk are present, allowing calves to crawl through the structure. Adult moose and elk can easily jump over the top rail.

Tying two wires together

Tying the top two wires together (Figure 5) for short distances can improve fence visibility and permeability for wildlife[7] and reduce fence damage at wildlife crossings. Similarly, the height of the bottom wire can be increased by tying it to the next wire to increase the ability of wildlife to crawl under a fence (Figure 5). Alternatively, the top and bottom wires can be tied together to create a wildlife crossing structure (Figure 5). Rope can be used to pull wires together to avoid shorting out an electrified wire.

Increasing visibility and reducing maintenance

Fence visibility can be improved by using visible posts rather than plastic, fiber glass or metal rods, reducing the space between posts to no more than 16 feet, tying objects such as seismic tape to the top wire, attaching a rail between posts, hanging a split PVC pipe over the top wire, stapling or tying a stick or sapling to the top wire, or clearing to an average tree height on either side of a fence line located in forested or tall shrub areas. A wooden top rail can be used to reduce fence maintenance at high frequency crossing sites. A top rail is visible to big game animals even in low light, and can withstand repeated contact as animals jump the fence. The rail is best secured to posts with lag bolts. The

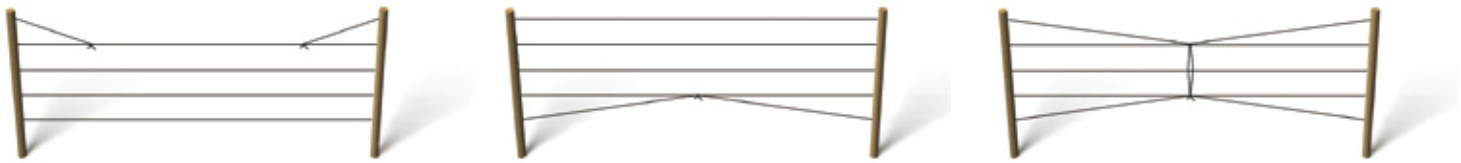

Figure 5. Wildlife crossing structures can be built simply by tying wires together.

distance between posts should not exceed 14 feet and the rail should be greater than 4" in diameter to withstand pressure.
Fences can be made more visible over watercourses to reduce impact injuries to waterfowl and other birds.

Access Structures for People

The *Recreational Access Regulation* provides legislated provisions to allow the public to access public lands grazing dispositions for recreation, subject to regulatory constraints[8]. Creation of access to grazing dispositions for trappers or other specified users can be designed during development of the disposition management plan. Bison operators can improve access for hunters and other recreational users by using crossing structures such as y-gates (Figure 6), stiles (Figure 7), or Texas gates/cattle guards (Figure 8). In addition, people can easily crawl under a 16" to 20" smooth bottom wire, recommended here for a wildlife permeable bison fence.

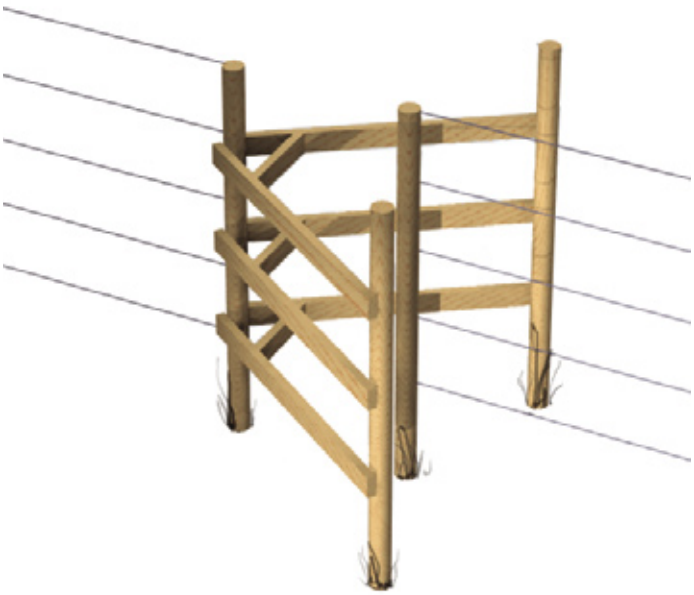

Figure 6. Y-gate design for public access.

Cattle guards for vehicle access

Cattle guards, sometimes called Texas gates, provide vehicle access without the need for a swing gate. Bison have been known to cross Texas gates built to a standard for cattle. A recommended guard for bison is 16 feet wide, with pole fences on each side of the structure (Figure 8). The spacing between pipes should be 7" to 8", which will deter even large wood bison from attempting to cross. The space between bars is sufficient to let bison pull their legs out and escape if they attempt to cross. The gauge of pipe used should accommodate the maximum weight of a vehicle expected to cross the structure (county graders, full

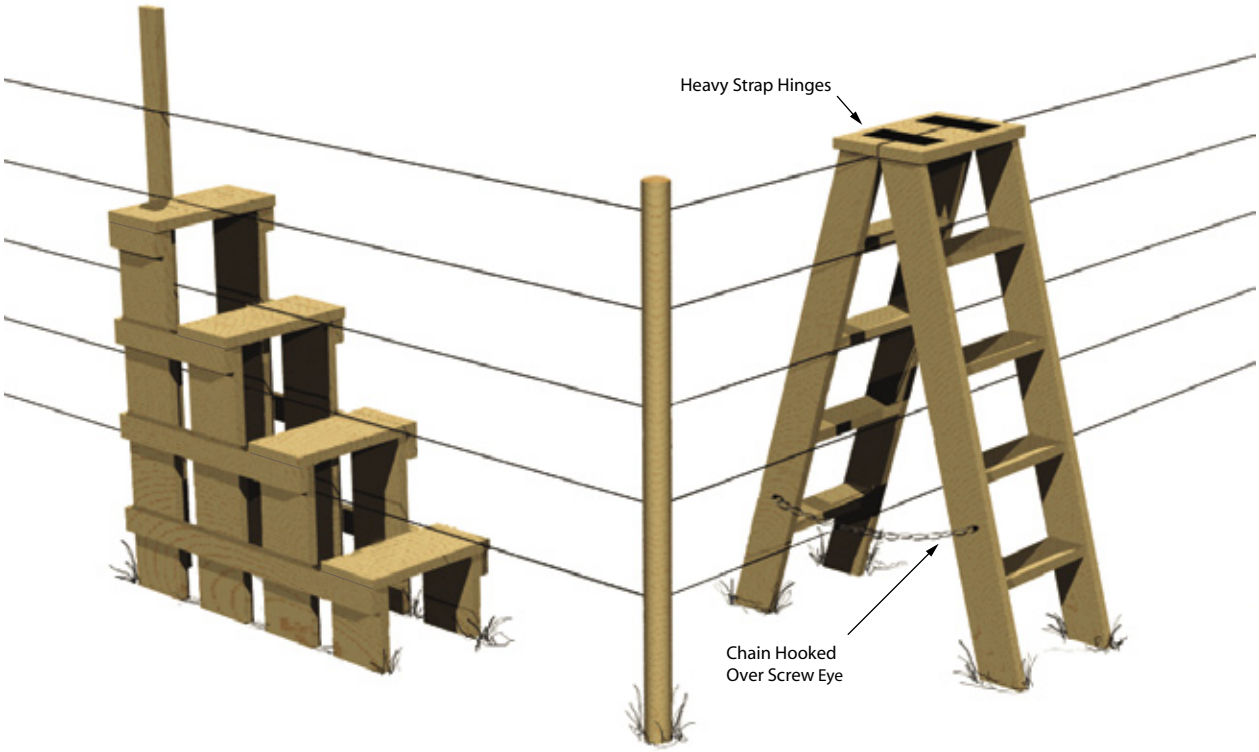

Figure 7. Stile design alternatives.

sanding truck, or loaded cattle liner). There should be a two-foot deep pit underneath the guard to accommodate packed snow.

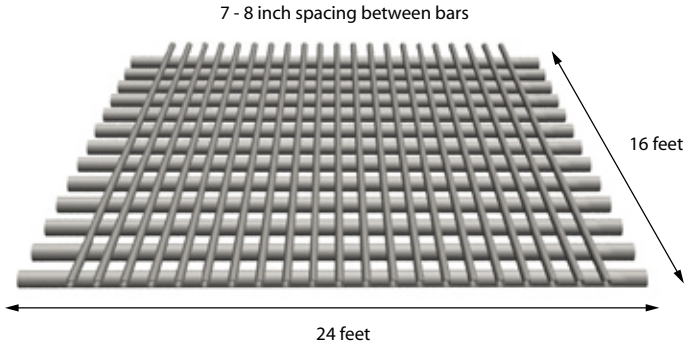

Figure 8. Cattle guard (Texas gate) design recommended for bison based on specifications provided by N. Cool and W. Olson, Elk Island National Park, and Mark Kossler, Flying D Ranch near Bozeman, MT.

MONITORING AND EVALUATING FENCE DESIGNS

These guidelines represent the best available ideas compiled from a variety of sources and the collective advice of bison producers, range and wildlife managers, hunters, and the naturalist community. Uncertainties about the effects of design options presented here on wildlife movements and for containing bison are acknowledged. The scientific literature on the effects of fences on wildlife movements is limited, particularly for juvenile moose and elk. Properly designed, peer reviewed research is required to advance the state of reliable knowledge of fencing effects on wildlife, particularly the impacts of fence height on movements and regional-scale cumulative effects. Stakeholders are encouraged to work collaboratively with resource management agencies and research institutions to evaluate the designs, and to make improvements as more is learned through research and experience. Fencing guidelines should be reviewed and revised periodically to incorporate advancements in knowledge.

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